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SCIENCE NEWS LETTER

THE WEEKLY SUMMARY OF CURRENT SCIENCE •



AMERICAN MACHINIST



JULY 25, 1931

The First Control of Hydro-Power

See Page 56

A

SCIENCE SERVICE PUBLICATION

SCIENCE NEWS LETTER

VOL. XX

No. 537

The Weekly Current Science



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DO YOU KNOW THAT

A new United States vessel designed for use in the region of Panama is especially equipped to rescue airplanes in trouble at sea.

With the establishment of its first general public health law, Turkey has begun progressive measures for child health and welfare.

Hunters in Illinois and Pennsylvania who are fighting crows have taken to wearing camouflage, such as overalls painted to blend with underbrush, and have learned to imitate crow calls.

Leakage of manufactured gas has been found to be the chief source of explosions in manholes which have resulted in loss of life and property damage.

The bark of a dog suffering from hydrophobia was recently broadcast by the Los Angeles Department of Health, so that the public might recognize the sound and avoid any dog acting suspiciously.

It is believed that the Egyptian pyramids were built before the principle of the wheel was understood.

The banana plant, tall as it grows, is not a tree because there is no wood in the main stem.

In translating 200 legal and business documents dug up in the ruins of the ancient city of Ashjaly, Asia Minor, Prof. H. F. Lutz found that the scribes and bookkeepers of 1800 B. C. made several spelling errors and one mistake in addition.

The metric system of weights and measures has been legally adopted in Persia.

In the United States alone, weeds cost agriculture and industry three billion dollars a year.

To beautify their faces, Mayas of Yucatan used to have their teeth drilled out with a sharp stone turned by a bow string, in order to insert inlays of jade.

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Science Service presents over the radio, an address

INFANTILE PARALYSIS

By Dr. William H. Park, director Bureau of Laboratories in the Department of Health, New York City, and one of the nation's leading bacteriologists.

Friday, July 31, at 2:45 P. M. Eastern Standard Time.

Over Stations of
The Columbia Broadcasting System

ASTRONOMY

Universe's Outposts May Be Forever Beyond Reach of Man

Famous Astronomer Believes That Even Larger Telescopes Will Not be Able to See Beyond a Definite Distance

"THE largest part of the universe is forever out of our reach." This is the opinion of the Abbé G. Lemaître, famous Belgian astronomer, whose ideas of an expanding universe have been one of the recent sensations of astronomy.

In a report to the Royal Astronomical Society, of London, his first paper on the subject to be published in English, he makes this statement, which indicates that even if telescopes are made many times larger than any in existence or projected at present, they would not see beyond a definite limit, even though there might be plenty of stars and nebulae beyond.

Our present-day telescopes are not very far from this limit. The 100-inch reflector at Mt. Wilson, largest in the world, can detect objects as far away as 50,000,000 parsecs, the parsec being the astronomer's unit of distance, and equal to 18 million million miles. About seventeen times this distance is the limit beyond which we cannot see, according to the Abbé.

The reason for the invisibility of very distant objects is that all their visible light is increased to wavelengths so great that they cannot be detected. This shift in the wavelength of light as it is moving towards or away from the earth is well marked for the nearer objects, and is called the Doppler effect. The eye, and the photographic plate, are sensitive only to a limited band of wavelengths.

Spectrum Displaced

An object at a distance of 870,000,000 parsecs would have even its shortest waves so greatly lengthened as to make them invisible. That is, its "whole visible spectrum would be displaced into the infra-red," quoting the Belgian scientist.

It has been suggested in the past that, if our universe is curved in some higher dimension, as the earth itself is curved in three, a beam of light could travel completely around, and return to its starting point. Thus it might seem that we could see ghost images of the

nebulae, or even our own Galaxy, by light that has gone around the other way. The Abbé Lemaître points out, however, that the great Doppler shift would make this impossible.

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PHYSICS

Radio Reflecting Layer Measured by New Method

A NEW and simpler method of measuring the height of the Kennelly-Heaviside layer of the atmosphere which reflects radio waves, has been worked out by Dr. E. V. Appleton and G. Builder, of King's College, London.

Rather complicated apparatus has been necessary for this purpose in the past. In the new method only a common triode oscillator with a large grid leak is used. This produces the intermittent pulses of radio waves necessary for this work.

The sending and arrival of the pulse were recorded photographically on a

PSYCHOLOGY

Children Know Lindbergh and Andy Gump; but Not Hoover

A HOT political campaign may get grown-ups terribly excited, but it leaves no impression on children of kindergarten age. When the question "Who is Herbert Hoover?" was put to 100 youngsters between five and six years old, not one could answer. Only one knew who Al Smith is. Yet 87 knew what Lindbergh did and Andy Gump was familiar to 74.

These questions were asked in the course of an investigation conducted by Cathryn A. Probst, at the Institute of Child Welfare of the University of Minnesota to find out how much information, and what kind, is the equipment



ABBE G. LEMAITRE

Whose ideas of an expanding universe have set the astronomical world agog. The Belgian cleric says that the wave lengths of very distant light become too great to be detected, and that the great Doppler shift makes impossible the passage of a light wave around the universe.

high-speed oscillograph which was placed at a distance of three miles from the transmitting station. On the record the direct impulses and those which had traveled 70 miles up in the air and back again were clearly recorded.

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of the child when he enters the first grade of the public school. The results of her study are published in the current issue of *Child Development*.

Despite the rarity of the horse, every one of the children knew that this animal has four legs. The only other questions which no one missed were "What do we use to cut cloth?" "What do you use to cut meat?" and "What do you use a saw for?" Among the other easy questions were those dealing with the seasons of the year, the functions of the dentist and barber, the colors of the flag, and a few of the simplest natural history questions. (Please Turn Page.)

Some of the errors were amusing. According to some of the children, a carpenter fixes carpet sweepers; buttermilk is made by butterflies; baking powder is used by ladies on their faces; a plumber pulls out plums, and a man who raises corn or wheat is a bachelor.

It was rather surprising that only 11 knew what Cinderella's coach was made of, and only 9 knew how many wings a butterfly has.

Occupation of Parents Important

The occupation of the parents made a great difference in the range of information of the children. On only 7 out of the total of 132 questions did the children of semi-skilled and unskilled laborers excell the children of the more trained occupational groups. These questions included "How many eggs in half a dozen?" "What time it is at noon?" "Who is Dempsey?" "How many horns has a cow?" "How many wings has a butterfly?" "What must you not do in tin-tin? (a game)" and "What must you have to play anty-over?"

Boys were better than girls on all types of questions except those dealing with weather and other natural phenomena. When it came to football, baseball, hockey, and even croquet the girls were left way behind. However, the girls knew more about skis and the game of bridge.

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METALLURGY

Better Source Found For Newly Discovered Metal

A NEW SOURCE of the recently discovered metal, rhenium, which contains up to one per cent. of rhenium has been announced at Berlin by its discoverers, Dr. Walter Noddack and his wife, Dr. Ida Noddack.

Previously the best ore from which the new metal could be obtained contained only one part of the metal in 660,000 of the ore. Dr. Walter Noddack has been seeking a more plentiful source of the metal for several years.

Rhenium, number 75 in the order of the elements, which was discovered a few years ago, is chemically similar to the common element manganese with which it often occurs in minerals.

Several thousands of tons of rhenium and rhenium compounds have been distributed among scientists throughout the world. They will study the properties of the new element on a larger scale.

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ARCHAEOLOGY

Damaged Sun Temple in West Rebuilt From Photographs

SUN TEMPLE, believed to be one of the last structures built in Mesa Verde National Park by the prehistoric race that once inhabited this region, has been the object of careful maintenance and repair work during the past few weeks, according to Superintendent Marshall Finnian, government representative in charge of the area.

Owing to the location of the old ruin on top of the mesa, it is exposed to destructive climatic influences and during the past winter considerable damage was caused to its walls through storms, freezing, and thawing. A section of the front wall 22 feet in length, facing the south, suffered particular damage. Moisture had penetrated this core and freezing had caused expansion which bulged the walls.

The method of repair was interesting. First, photographs were made of this section of wall. Then the top layer of rocks was removed and placed face downward on the ground, the same space being allowed between the rocks as their actual spacing in place in the wall. The succeeding layers of wall were handled in this fashion until the damaged section had been removed. The stones were then relaid in their actual positions. In replacing the wall the photographs and the actual spacing measurements were used as a guide.

A new capping of reenforced con-

crete with expansion joints at correct intervals is now being laid on the walls to prevent further deterioration.

Sun Temple, a ruin of mystery, is believed to have been contemporary with the largest and latest of the great communal dwellings which the prehistoric people of the region built deep in enormous caves. Probably it dates from 1200 or 1300 A. D. Its purpose is unknown and has long been a matter of speculation.

Many theories have been advanced concerning it, including the possibility of its having been intended to serve as a fortification against hostile invaders. The most appealing idea, according to the late Dr. J. Walter Fewkes, who made the original excavations, is that it was intended for a ceremonial building. Whatever the use for which it was destined, it apparently never was finished.

The ruin takes its name from a peculiar impression found on the upper surface of a large rock protruding from the base of the southwest corner of the building and inclosed by low wing walls on the north and south sides. The ancient cliff dwellers were sun worshippers, and it is believed that the old impression was inclosed as a shrine because of its resemblance to their sun emblem.

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ENGINEERING

Engine Without Boilers Runs On Water in Place of Steam

Invention of British Engineer Upsets 300-Year Tradition And is Expected to Give Cheaper Mechanical Power

A NEW kind of engine that uses liquid water instead of steam, discards boilers and condensers, develops more power in less space than ordinary steam and gas engines, with freedom from explosion hazards and heat wastes, will shortly be offered for experimental commercial use in England.

It is the invention of J. F. J. Malone, engineer, of Newcastle-on-Tyne, who has experimented with the water engine for several years. Details of its operation have just been revealed.

Since steam and other engines have been worked always by the expansion of gases of one kind or another for some 300 years, this new kind of prime mover that is operated by expansion of liquid instead of expansion of gases has created much interest in engineering circles.

Both the new water engine and conventional steam engines use water, but in the case of the steam engine the water must be changed to steam before any work can be done. In the Malone engine the water stays liquid even under pressures of tons per square inch created within the engine.

Rapid Temperature Change

Rapid heating and cooling of the liquid water are necessary in order that the water engine will operate. This was accomplished by Mr. Malone through the development of a novel form of heat transferer within one of the cylinders of the water engine.

Other advantages claimed for the engine are:

Only a small amount of water is needed and this reduces the size of the engine and allows it to be used where water is scarce.

It runs and changes speed more noiselessly than conventional engines.

It loses less heat than other engines and its outside shell is cool to the touch.

Its mechanism is simpler and the working parts need be opened for inspection only once in four years.

There is no incessant boiler cleaning,

no water gauges, no risk of shortness or foulness of water.

The control system is simpler than in the steam engine.

It has no exhaust as the water is used over and over.

All bearings within the engine are cold and lubricated by the water itself.

The hot air engine which was used in scientific laboratories before the electric motor became common, is the nearest approach to the water engine in its method of working. Two cylinders are used with pistons connected to the same shaft and the water is pushed back and forth from one cylinder to the other.

One cylinder, called by the inventor the "thermodynamic pile," has one end heated by hot gases from the fire to a temperature of 900 degrees Fahrenheit. The other end is cooled continuously by a stream of cold water or air to about 70 degrees Fahrenheit and the water in this cylinder circulates continuously through a series of concentric tubes being alternately heated and cooled in its motion. The layers of heated and cooled water pass in opposite directions through the neighboring layers of the pile which are only about one-hundredth of an inch in thickness. By this means a very rapid and complete transfer of the heat of the hot gases of the furnace to the water is obtained so that there is no difficulty in running the engine up to 250 revolutions per minute.

While the water in the heating pile is being heated the pressure rises and pushes some of the working water over into the larger second cylinder where it pushes the piston outwards against the applied load. At a later part of the cycle the circulating water in the pile is being, on the whole, cooled and the working piston in the (cool) second cylinder moves inward with the decreasing pressure. The use of a liquid instead of a vapor allows great changes of pressure with smaller relative changes of temperature.

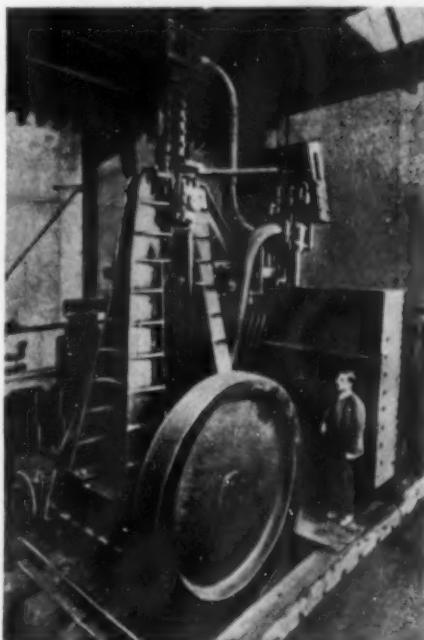
"A liquid engine locomotive," said Mr. Malone, "could give the same power for half the coal consumption and no water consumption, have a greater starting effort, being free of gears would be as elastic, would occupy the same space, and would weigh and cost the same as a good type steam locomotive."

For an engine of 100 horsepower or over, the "indicated" efficiency as measured by three different engineers, was 27 per cent. In comparison with this, a superheated steam locomotive working between 550 degrees and 230 degrees gives 8 per cent. and the best type of superheated steam marine engine working between 550 and 125 degrees, give a maximum "indicated" efficiency of 14.7 per cent.

A huge power station steam turbine would give a slightly greater over-all efficiency than the small water engines already constructed, but the efficiency of the water engine would increase as the size is increased.

Mr. Malone expects that his new engine will be adapted to highway traction engines, ships, small power stations, locomotives, as well as more conventional uses. It promises to be particularly useful in isolated and desert locations where water and good grade fuel are scarce.

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WHAT WILL IT DO?

"A liquid engine locomotive could give the same power for half the coal consumption and no water consumption . . . and cost the same as a good type steam locomotive."

Artificial Insanity

By Controlling Oxygen of the Air Scientists Have Induced Temporary Insanity and Revived Dementia Praecox Patients

By MARJORIE VAN DE WATER

THE AVIATOR soaring high above the clouds, and becoming lightheaded and weak-willed. The mountain climber toiling up the steeps of Pike's Peak, and suffering from mountain sickness. A group of volunteers in a psychology laboratory in New York City, breathing air in which the oxygen proportion has been reduced, and becoming temporarily unbalanced mentally and emotionally. Patients with a mental disease which has reduced them to a stuporous state breathing a mixture of carbon dioxide and oxygen, and miraculously becoming active.

All these may have provided scientists with a new approach to the age-old and vexing problem of the cause and possible cure of that mental disease which afflicts about one-fifth of all hospital patients—dementia praecox.

For the characteristic effects which come from breathing air containing too little oxygen have recently been found to be very much like those which come from taking too much alcohol. And, except for the fact that they are temporary, they are significantly similar to the symptoms of that type of insanity known to physicians as dementia praecox.

Like the drunken man, the person starving for oxygen seems to lay bare his true self. All the brakes that he has learned to put on his impulses as a result of training are released, and he responds in a manner characteristic of his innate nature. One man will become unreasonably angry, will try to break things to pieces. Another may become sentimental even to a silly extent. One becomes happy and starts to sing, another may go to the other extreme of moroseness.

Like the drunken man, too, the person deprived of oxygen is usually completely unaware that anything is wrong with him. For this reason the U. S. Navy now equips the oxygen apparatus used by high-altitude flyers with an automatic valve which feeds him the amount of oxygen which he should have at the altitude at which he is flying. If

it were left to the flyer to decide when and how much to turn on the oxygen, he might go on thinking he was doing well without it until he was unable to turn it on. The Army Air Service requires the use of oxygen by all flyers going above 15,000 feet.

Each person has his "ceiling" beyond which he cannot go and retain his normal mental ability. The U. S. Navy Air Service therefore classifies aviators according to the altitude in which they can fly in safety. This is done on the ground before the candidate makes even his first flight with the aid of a "rebreather."

Same Air Breathed Again and Again

The "rebreather" holds a tank filled with ordinary air. This air is inhaled by the person being tested. The exhaled air passes through a container over a chemical, sodium hydroxide, which removes the carbon dioxide produced by breathing and then it goes back into the original tank to be breathed again. After each return, the air is perfectly free from poisonous elements, but has a smaller percentage of oxygen. The effect of breathing this oxygen-deficient air is practically the same as that of breathing ordinary air at greatly reduced atmospheric pressure.

When the candidate begins to fail on the simple mental tests given him while breathing oxygen-deficient air he is immediately removed from the apparatus. The air in the tank is tested to find out what percentage of oxygen remains, that is what "altitude" has been reached. That marks that man's ceiling.

In the psychology laboratory at Columbia University, under the direction of Dr. R. A. McFarland, 18 persons volunteered to "go up" in a similar apparatus. Starting at 16,000 feet they went up in steps of two to three thousand feet until the individual ceiling was reached. At each level they took a number of tests of simple and complex mental functions which would bring out emotional reactions and temperamental differences, such as irritability and persistency.

Dr. McFarland found that the higher

centers of the brain were the first affected by the lack of oxygen. Simple muscular reactions, and actions that were purely a matter of habit could be continued. In the test which involved discrimination and choice between a number of colored lights, however, he found a marked deterioration with increase in altitude. Even at 18,000 feet, the subjects were slow in choosing and often made mistakes of which they were quite unaware.

One of the first effects noticed was a narrowing of the field of attention. The person who is feeling the lack of oxygen will be able to notice only one thing that he is concentrating on. Of everything else that is going on about him he is unconscious.

Memory and the sense of relationships was greatly impaired in those persons who were able to go above the 20,000 foot level. Vision and the other senses, one by one, became impaired, hearing being the last to succumb.



FOR PROTECTION

From lack of sufficient oxygen in the rare atmosphere far above the earth Lieu. Apollo Soucek, altitude record holder, is wearing an apparatus to supply the deficiency artificially. Should he go up high enough without this apparatus he would develop symptoms similar to those of dementia praecox patients.

And quite as important as the changes in mental ability and physical coordination were the changes in character and temperament. The person who makes the most crude blunders will continue to bask in the sublime confidence that he is doing very well. And then, too, the person who still retains a knowledge of what should be done to pass the test will lack the will power to make even the simplest move toward it.

Self-Control Breaks Down

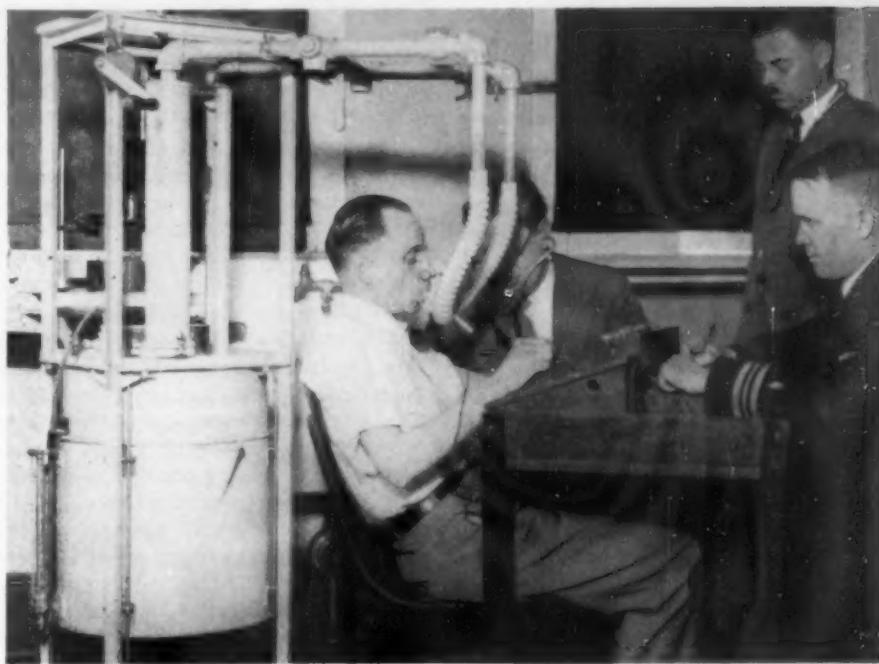
Dr. McFarland's last test, although designed primarily to measure muscular coordination, served admirably to show how the spirit of persistency and also all self-control are broken down when the system is deprived of enough oxygen. This test involved the rolling of a steel ball-bearing up an inclined plane perforated with small holes into which the ball-bearing could easily fall. The guiding of the ball-bearing was done with a knitting needle. Dr. McFarland reported:

"There were great individual differences in the emotional outbursts and breaking down of inhibitions. Some individuals reacted by marked irascibility of temper, or by trying to break the apparatus to pieces; others by uncontrollable laughter, or silliness, or flirting with the experimenter and apparatus. There seemed also to be some consistency in these reactions suggesting that the basic and uninhibited temperament of the individual had been exposed. The emotional behavior and the breaking down of inhibitions, as well as the changes in neuro-muscular control seem to be very similar to the effects of alcohol."

While psychologists have been studying the peculiar manner in which oxygen deprivation produces a condition like nervous breakdown, or mental or emotional disease, other scientists have been approaching the same problem from the opposite angle.

Three pioneers, Drs. A. S. Loevenhart, W. F. Lorenz, and R. M. Waters, experimenting at the University of Wisconsin, undertook to see what could be done to relieve patients with the mental disease dementia praecox who had sunk into stuporous catatonic state—that condition which so strongly resembles the final stages of oxygen deprivation. The patients were allowed to inhale for a few moments a mixture of oxygen and carbon dioxide.

The results were startling! From being stuporous and mute and mentally inactive, they became active and com-



"GOING UP"

While sitting in the laboratory taking the "rebreather" examination given applicants for the Navy's Air Service. The amount of oxygen in the air is reduced until the applicant's mind no longer functions normally or he shows signs of failing physically. Dr. Joel J. White, of the U. S. Navy Medical Corps, is giving the test.

municative. One of them who had been unable to speak or even eat for more than six years, at last was able to break her long silence. For about two minutes she uttered only a jumble of unintelligible but speech-like sounds, but after that the words became distinct, and she successfully held a conversation with those about her. To quote the experimenters themselves:

Inaccessibility Disappeared

"The most favorable and striking reactions occurred in those patients who had been mute and mentally inaccessible for a long period of time. In these cases after a short period of respiratory stimulation, this inaccessibility disappeared and the catatonia passed off.

"A number of patients have carried on conversation. A few mentioned depressive thoughts. One patient was markedly facetious, making responses typical of talkative hebephrenic praecox. Another patient, the least reactive of those so far observed, showed only a disappearance of muscular tension and a voluntary looking about the room at those standing near.

"A number of patients appeared frightened when the cerebral stimulation developed; they looked about apprehensively but became calm and at ease quite

promptly when efforts were made to reassure them. In other words, they seemed to comprehend the situation correctly, and following this almost immediately they made coherent and relevant replies to questions."

This return to the world of living lasted for some patients for as long as 25 minutes. Others began to lapse after only two minutes. Dr. Loevenhart and his associates describe "one notable case where there was a prolonged period of from ten to twelve minutes during which the patient maintained a comprehensive conversation without any evidence of psychosis."

Then begins the tragic return to the former condition of muteness and complete inaccessibility.

"It is especially striking to note how completely the former muscular state is resumed," the scientists report. "This reproduction is faithful to the minutest degree; the same posture, the same facial grimace, and apparently the same mental state. In some cases the lapse to the original state is remarkably sudden, so that a sentence begun is left unfinished."

These experiments point to the conclusion that a certain amount of oxygen absorbed by the body is essential to the proper functioning of the mind. For some reason, (Turn to page 58)

ENGINEERING

**98-Ton Butterfly Valve,
A Simple Device**

See Front Cover

A GOOD place for a photographer to take a picture, this penstock will be serving an even better purpose when it begins to carry water through the dam to turn the huge turbines of the Ruskin power plant, British Columbia.

The flow of water through this 19 foot diameter intake pipe is controlled by the butterfly valve just behind the workman in the photograph. The entire valve weighs 98 tons and its moving disk, 47 tons. It is operated hydraulically by oil at 200 pounds per square inch pressure and when closed is sealed by a rubber tube carrying water under pressure.

The same reasons that prompt engineers to put butterfly valves weighing only a few ounces in automobile carburetors, cause them to specify butterfly valves weighing many tons for hydroelectric power plants.

They are simple; they can be turned on and off rapidly and easily because the water pressure is the same on both sides; and they offer little resistance to water flowing through them.

With the butterfly valve engineers exert first control over the power made available by their dams. After it is converted into electricity it is switched from place to place many times.

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ASTRONOMY

**Comet Photographed 25
Years Before Discovery**

THE REMARKABLE Schwassmann-Wachmann comet, which varies in brightness and remains in view of the earth throughout its circumnavigating of the sun, existed at least twenty-five years before its discovery by the German astronomers at Hamburg in 1927.

Leland E. Cunningham of Harvard College Observatory has just found that a comet located by Dr. Karl Reinmuth of Heidelberg Observatory on photographic plates made in 1902 is the same as the now famous Schwassmann-Wachmann comet. The official announcement of identity of the two objects is contained in Harvard College Observatory announcement 159 now being mailed to astronomers.

The famous comet that is named after its two German discoverers is unusual

because it has a nearly circular orbit, remains more than half a billion miles from the sun, traveling between the orbits of Jupiter and Saturn, and it undergoes sudden variations in brightness.

For a comet it has an unusual behavior in its brightness. Prof. George van Biesbroeck at Yerkes Observatory finds that it changes its brightness suddenly; early this year it had one peculiar outburst which changed its brightness a hundredfold within a few days.

Never is this comet seen with naked eyes. At its brightest it is only twelfth magnitude, which means that only powerful telescopes can catch it. The Schwassmann-Wachmann comet is also probably the first comet that is observable all the way around its orbit.

Although the comet was first discovered in 1927, it has been given the designation of 1925 II in astronomical literature. This is because it was nearest the sun in 1925 and it was the second comet of that year to pass perihelion.

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ENGINEERING

**Heavier and Stronger Rail
Designed for Railroad**

THE FIRST heats of the heaviest and strongest railroad rail ever built for regular service are being rolled, it is announced by Elisha Lee, vice-president, and W. S. Franklin, assistant to the vice-president, of the Pennsylvania Railroad, in a report to the American Society of Civil Engineers.

The new rail section weighs 152 pounds per yard as compared with the former 130 pounds and is the result of intensive study by engineers of the Pennsylvania Railroad and of the United States and the Bethlehem Steel Companies. It will be rolled by the two steel companies.

Although the new rail is only 22 pounds heavier than the present 130 pounds standard, it is 75 per cent. stronger.

It will be used where traffic is heaviest. The rail that will be used on the greater part of the road is a second new type which is only one pound heavier than the present standard, but 22 per cent. stronger.

Two years of work have been spent in developing the super-rail sections. The new rail is expected to make possible the concentration of traffic, particularly freight, into even heavier train units than are now in use.

*Science News Letter, July 25, 1931***IN SCIENCE**

ORNITHOLOGY

**Topsy-Turvy Ravens Not
Uncommon Sight in Iceland**

RAVENS FLYING upside down are no rare sight in the far-off island of Iceland. So states a Danish observer, A. Vedel Taning, in a communication to the British scientific journal, *Nature*.

Commenting on a report in which a British bird-watcher reported topsy-turvy ravens as a rarity, Mr. Taning says:

"For some years I have had the opportunity of seeing many hundreds of these interesting birds in Iceland, where the number of individuals of this species apparently is rapidly increasing, probably because the refuse from the fisheries affords food for very large numbers of them. In some places—as Westmannaeysir and Hnifsdal in Isafjord—I have seen about a hundred of these birds performing evolutions in the air round favourite resting places, and here it is a rather common appearance to see the birds flying upside-down in the manner described, though I do not think I have seen them flying for so long a distance as 1000 metres, as recorded by Mr. Evershed. The upside-down flight is, so far as I can judge, not particularly connected with the courtship, though it is most often seen at the time of courtship, when air acrobatics are especially performed by the birds."

Science News Letter, July 25, 1931

PSYCHOLOGY

**Slow Reading Child is Not
Necessarily a Dull One**

THE CHILD who worries parents and teachers by his difficulty in learning to read is not necessarily a dull child. Miss Frances I. Gaw, of the Seattle public schools, has found from a study of about 2,000 children in the fourth grade that decided reading difficulty exists among boys and girls of normal capacity. An intensive two-year study of 40 of the children revealed that a variety of factors are to blame. These include health, mental capacity, home conditions, and the child's emotional stability.

Science News Letter, July 25, 1931

SCIENCE FIELDS

GENETICS

Study Mentally Sick Twins To Learn About Heredity

TWINS suffering from mental diseases are the subjects of a comprehensive program of research being conducted by Drs. Aaron J. Rosanoff and Isabel A. Rosanoff, of the University of Southern California. These scientists have studied 200 pairs of twins having some mental disorder affecting one or both twins. They have undertaken to collect at least one thousand such cases.

The main purpose of the investigation is to compare identical twins having the same inborn characteristics with others having different heredity, thus gathering more information regarding the relative importance of heredity and environment in the causation of mental and social disorders such as alcoholism, drug addiction, crime, epilepsy, dementia praecox, and manic-depressive insanity.

Science News Letter, July 25, 1931

ZOOLOGY

Zoologist Seeks Rare Toad Carrying Young in Pockets

THE SURINAM TOAD, a rare and most curious species that carries its eggs and young in pockets on its back, will be the main objective of Dr. William M. Mann, director of the U. S. National Zoological Park, when he leaves on July 22 for an expedition into British Guiana. There are a lot of other animals in South America he would like to have, Dr. Mann told Science Service, but his heart is specially set on getting a collection of these interesting toads for the new reptile house in the Washington zoo, America's newest and finest show-place for cold-blooded animals.

The Surinam toad shares its peculiar form of maternal solicitude with the kangaroo, a mammal, rated much higher in the evolutionary scale. It differs from the kangaroo, however, in carrying its offspring on its back instead of in an abdominal pouch.

When the female produces her eggs, she develops deep pockets all over her back, each of just the right size to hold

an egg. With the assistance of her mate, she manages to get her eggs into the pockets, where a natural sealing substance closes them in.

There they remain until they hatch, and indeed until the toadlings that emerge from them are ready to hop out and make their own way in the world. For the tadpoles of the Surinam toad, though they have gills and tails like toad tadpoles everywhere, never get a chance to swim until they are full grown. They pass through all the changes of their infancy in the mother's back-pockets, sticking their heads out through the covers, until at last their legs are grown. Then, relieving their mother of the burden of parenthood in a most literal manner, they hop along their independent jungle way.

Dr. Mann stated that though these toads are comparatively rare he has good hopes of getting at least one.

Science News Letter, July 25, 1931

PHYSICS

Shining Platinum Proves Best Light Standard

MOLTEN PLATINUM, precious metal, shining with heat, gives the world its best standard of light with which to compare the brightness of lamps or the stars.

At the National Bureau of Standards in Washington, D. C., four physicists have produced this new light standard. Using an idea suggested by Dr. G. K. Burgess, now director of the Bureau of Standards, and his associate, the late Dr. C. W. Waidner, the platinum light standard was tested experimentally by Dr. H. T. Wensel, William F. Roeser, L. E. Barbow and F. R. Caldwell of the bureau's staff. A flame of standard type burning fuel at a known rate has been used in the past as a standard but its brilliance varies with changes in atmospheric conditions.

Platinum, pure to one part in 30,000, is fused electrically in crucibles of thorium oxide.

Comparisons with its light are made when the platinum is melting or freezing. Its temperature then is about 3200 degrees Fahrenheit. Light produced under these circumstances is remarkably constant. Reproducibility is of first importance for a standard and the values of the platinum standard are repeatable to a tenth of one per cent. The precise value of the new light standard is 58.84 international foot candles per square centimeter.

Science News Letter, July 25, 1931

PSYCHOLOGY

More Brains and Honesty Found in Only Child

THE ONLY CHILD is above average in intelligence, in moral knowledge, cultural background and honesty. He is just average in cooperativeness, and persistence; but below average in self-control and in popularity as indicated by ratings made by his teacher and classmates.

This characterization of the child who has no brothers or sisters was made by Dr. Julius B. Maller of Columbia University in a report published in the scientific publication, *The Journal of Social Psychology*. Dr. Maller has been making a study of relationship between size of family and personality of the children based on data gathered in connection with the Character Education Inquiry at Teachers College.

Children in families having from two to five offspring Dr. Maller found to be superior in both moral and intellectual characteristics to those born into larger family circles.

"The children of small families are highest in intelligence, in honesty, in inhibition, and in ratings by teacher and classmates," Dr. Maller concluded.

"The children of large families are lowest in intelligence, moral knowledge, cultural background, honesty, cooperativeness, inhibition, parents' intelligence, and moral knowledge. They are highest in scores of persistence."

Science News Letter, July 25, 1931

ENGINEERING

Well in England May Be Fed by Water From France

WATER spouts six feet above the ground without the aid of pumps from a well that has recently been sunk in Buckingham, England. The well is of the true artesian type and is a neighbor to a similar one opened last year which produced the astonishing flow of 6,000,000 gallons a day.

The new well penetrates the lower greensand at a depth of 1,033 feet where the pressure is sufficient to drive the water to the surface. The bore of the well is eight inches in diameter and two gate valves control the flow which has already reached half a million gallons a day. Water for this deep well is believed to come from high land as far away as France.

Science News Letter, July 25, 1931

From Page 55

these catatonic patients are unable to get their necessary ration of that life-sustaining gas under our ordinary atmospheric conditions. They may breathe just as much as you do, but do not make the same use of it.

At St. Elizabeth's hospital, the government hospital for the insane in Washington, Dr. Walter Freeman set to work in his laboratory to discover what this defect might be.

A careful microscopic and chemical examination of the brain cells of persons who had died with schizophrenia, or dementia praecox, revealed the fact that these cells contained decidedly less iron than the brain cells of others. Iron is a part of every living cell and is

necessary to the process of oxygen metabolism. The reason that cyanide is such a deadly poison to cells is probably because it combines the iron in the cell to form an inert compound.

Dr. Freeman's discovery of the deficiency of iron in the brain cells of dementia praecox patients may therefore be an explanation of why these persons cannot make use of the oxygen they breathe. He, himself, regards his find only in the light of a very promising lead for further research, however, and is very careful to warn against the raising of false hopes of a dementia praecox "cure."

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Science News Letter, July 25, 1931

PHYSICS

Nothing Solid Left as Atoms Dissolve in Nebulous Waves

Philadelphia Scientist Performs Experiments Which Adds New Proof to the Latest Theory Concerning Matter

SOILD MATTER was actually solid—until about 100 years ago. Then it was decided that most of a solid is empty space with solid atoms scattered about like bees in a swarm.

Now the bees may not even be solid. Latest news from the atomic research front shows that even the atom has lost its solidity. At the Bartol Research Foundation at Swarthmore, Pa., a stream of atoms has been made to behave like immaterial waves scattered in many directions.

Dr. Thomas H. Johnson of the Franklin Institute, Philadelphia, has fired a stream of hydrogen atoms at the surface of a crystal of lithium fluoride and by observing the spread of the reflected atoms has found the wave length of the atoms and has learned how the network of atoms on the crystal surface is fitted together.

This discovery is the latest development in the great new branch of physics inaugurated in 1924 by the French nobleman and scientist, Prince Louis de Broglie, who first proposed to give matter the properties of waves. The revolutionary new wave mechanics, which threw many of the cherished notions of the nineteenth century overboard, has grown with amazing speed since its birth

at the hands of de Broglie and now is the main weapon of scientists in attacking the intricate problems of the structure of the atom.

The present experiments confirm these new theories of the wave-like behavior of all matter. The beam of atoms reacts with the surface in much the same way as would a beam of light waves. It is, in scientists' language, "diffracted."

Based on Quantum Theory

This sort of thing was never suspected until the arrival of the quantum theory in physics on which, for instance, television and the talking movies depend. A beam of light was supposed to consist of waves. On the other hand, atoms or electrons in motion seemed to be like bullets.

This simplicity is all confused now. Light entering a photoelectric cell seems to act like a stream of particles, and it has been shown by two physicists of the Bell Telephone Laboratories, Drs. C. J. Davisson and L. H. Germer, that even electrons, those lumps of negative electricity that make the electric current, might, under special circumstances, behave like waves. These inconsistencies have led physicists to think that the distinction between lumpy particles and



DR. THOMAS H. JOHNSON
Of the Franklin Institute, Philadelphia, whose recent experiments have given weight to the revolutionary ideas of the new wave mechanics. He has been able to determine the wave length of atoms and has shown how networks of atoms on a crystal surface are fitted together.

smooth tenuous waves was not so clear as they had thought.

Dr. Johnson's present experiments supply the last link in this chain of contradictions. He found that even atoms of hydrogen, apparently the most material of things, may become immaterial enough to act like waves breaking on a rocky shore when they are fired at the regular lattice work of a crystal. The atom waves are very short: that is, the distance from crest to crest of the waves is only about the diameter of an atom, one hundred millionth of an inch.

X-rays have been used for some time to explore the interior of crystals. The shortness of the new atom waves enables them to do still more and disclose even the small irregularities of the surface.

Before this work a crystal was regarded as made up like a super-chessboard with some four thousand million million squares on the square inch. Dr. Johnson's work shows that minute cracks break up the large board into a multitude of small ones having some four hundred squares on each. Enough atomic chessboards to take care of a gigantic chess match in which every member of the human race engaged are to be found on an area of about one ten-thousandth of a square inch of crystal.

Science News Letter, July 25, 1931

METEOROLOGY

How Storms Begin

"A Classic of Science"

Solution of One Weather Mystery Made Espy Famous When He Worked Out the Mechanism of the Whirling Storm

THE PHILOSOPHY OF STORMS.
By James P. Espy. Boston: Charles C. Little and James Brown. MDCCCLXII (1841).

(Article 12)

SUPPOSE the dew point at 71° , when by article 1 the quantity of vapor in the air at the surface of the earth is $1/64$ of the whole weight. Suppose also the temperature to be 75° , or 4° above the dew point; suppose a column to begin to rise either from superior heat or superior moisture: and suppose an extreme case, unfavorable to the theory that the column in ascending cools by expansion one and a half degrees for every hundred yards of ascent, while the atmosphere around the column is only one degree colder for a hundred yards; the effect will be, that the column will ascend only a little more than three hundred yards when some of its vapor will begin to condense. Now to ascertain what its temperature shall be at any particular height, sixty hundred yards for instance, we have only to find a point below 75° , at which sufficient vapor will be condensed to heat up the air as many degrees as this point wants of being one degree and a half below 75 , for every hundred yards of ascent, or in the present case 90° . For as in this case the air is supposed to fall in temperature 90° , in ascending sixty hundred yards, there is nothing to prevent its falling this quantity but the latent caloric evolved in the condensation of the vapor. Now by examining a table of the dew point (129), according to Dalton, it will be found that if the temperature falls 48° , it will, after making allowance for the increased space it occupies, condense $20/38$ of its vapor, sufficient to heat up the air 42° , which being added to 48° makes up the 90° which it would have fallen if there had been no latent caloric in the vapor condensed.

But as the atmosphere on the outside of the ascending column is 60° colder at the elevation of sixty hundred yards,

and within the column only 48° colder, the specific gravity of the cloud will be at least $1/40$ less than the outer air at the same elevation, even without allowing anything for the 140° of latent caloric given out by the congelation of the water. In this calculation, no allowance is made for the greater specific heat of rarefied air, but this will be fully compensated by the 140° given out by the congelation of the water and by the higher dew point in the column than in the surrounding air.

Vapor Condensed

13. If it had been assumed that air, in ascending, falls only one degree for a hundred yards, then, according to the same mode of calculation, it will be found that by falling 36° , making allowance for the greater space now occupied by the air, sufficient vapor would be condensed to raise the temperature of the air 24° , and then, 24° added to the 36° , will make up 60° , which would have been the actual depression of temperature in ascending sixty hundred yards, if the vapor had contained no latent caloric.

It is not at all probable that the actual depression of temperature of air on being rarefied by diminished pressure, would be greater than one degree and a half for every hundred yards of

ascent; but even if it should be two degrees, it will be found that the latent caloric evolved when the dew point is high, would prevent it from falling one degree for every hundred yards of perpendicular ascent, and therefore, even in this case, its specific gravity would be constantly less than that of the atmosphere at its own elevation.

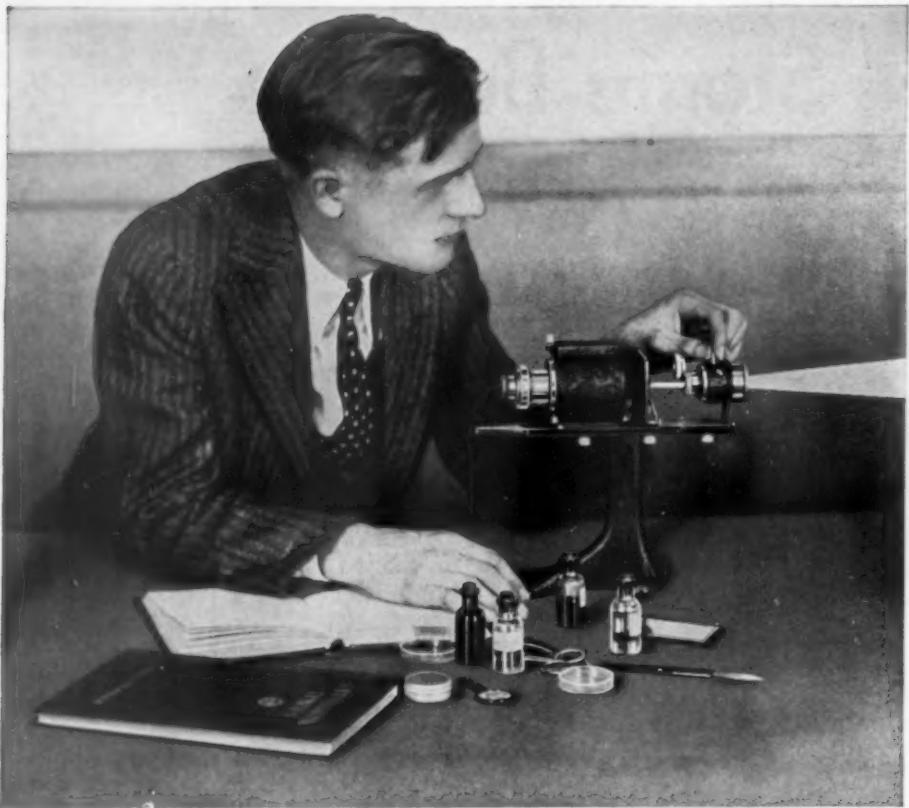
14. If we suppose a very narrow column of air to begin to rise, as mentioned in article 12, and a cloud to be formed in it reaching to a height where the barometer would stand only one-fourth of thirty inches, it will be then at a temperature of one degree at the upper end, and will have condensed two-thirds of its vapor capable of heating the containing air 50° , and then, according to article 13, it will be 50° warmer than the surrounding air at that height. And as the vapor condenses more rapidly in the lower part of the column than in the upper, the mean temperature of the whole column may safely be taken at 25° above the surrounding air; therefore, the mean temperature of the air being about 32° , the expansion of the columnar air will be about $25/480$, which would cause the mercury in the barometer to be depressed about one inch and a fifth, and cause a velocity in the column upwards of two hundred and fifty-six feet per second.

15. The quantity of rain produced by the refrigeration of this ascending column, would be five inches in one minute and twenty seconds, if it were all to fall on a space equal in area to



HOW A TORNADO STARTS

The center of the storm within the cloud, descending from it, and marking its path upon the earth, from Espy's "Philosophy of Storms."



A Micro Projector for High Schools

A NEW micro-projector has recently been devised by Bausch & Lomb especially for use in high schools. As an aid to the student's individual work with the microscope, or used alone for group instruction where other microscopes are not available, the new instrument is of great value. The use of this micro-projector simplifies notebook drawing immeasurably. It is low in price and in operating cost, as well as being simple and compact.

The projector serves three definite purposes:

1—It projects permanently mounted specimens;



2—It projects specimens mounted in liquids;
3—It supplies a ready means for accurate drawings of microscopic fields.

Projection can be accomplished under practically daylight conditions.

The instrument is sturdy and easily portable. It is furnished with both coarse and fine focusing adjustments, and its optical equipment gives it a sufficiently wide range of magnifications for high school work.

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the area of the column. This, however, could seldom happen, as the drops of rain would be carried upwards to a height greatly beyond the region of perpetual congelation, and thrown off at the sides in the form of *hail*.

16. The dew point in the above calculation was assumed at 71° ; if it had been taken at 80° , to which it sometimes rises at Philadelphia, it would have been found that the barometer would in that case descend one inch and nine-tenths, and all the other effects would be proportionately aggravated.

17. It will readily be perceived that the air will spread out more rapidly at the upper end of the column than it runs in below, and thus, at some distance from the column, especially in front of the storm at the surface of the earth, the barometer will rise, and the effect of this will be to increase the velocity of the ascending column, for which no allowance is made in the preceding calculation.

Air Thrown Inwards

18. It will also be perceived, that the air under the column being relieved from a pressure equal to an elevation of more than ten hundred yards, will fall in temperature more than 10° , and of course the cloud will reach the earth, unless the temperature of the air should be about 10° above the dew point, in which case it will reach very near to the earth.

19. In this case there will be a spout, and the air below the cloud reaching to the surface of the earth, the trees will be thrown inwards, and also forwards, if the spout has a motion along the surface of the earth.

20. The spout must have a motion on the surface of the earth, if there is a current of air at the upper end of the column, for this current will move the upper end of the column in its own direction, and the lower end will immediately advance with it. And as it is known that the uppermost stratum of air in which clouds appear, moves constantly at Philadelphia, and probably throughout the northern temperate zone, from a point a little south of west; and as it is certain that the upper end of the spout reaches far into this stratum, the motion of the spouts in this climate should be generally in this direction, or to a point a little north of east. Indeed, they will always move in this direction unless they meet with a middle stratum of air moving in a different direction.

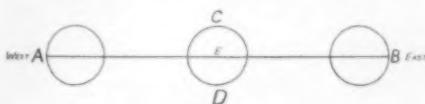
21. The narrower the spout is, the

more readily will the air at the upper end be able to spread out and leave the column below free from the pressure of accumulation, and the more violent will be its effects at the surface of the earth.

22. If the dew point should be much below the temperature of the air, the visible spout or cloud will not reach the surface of the earth, and then the rain falling through the lower atmosphere may, partly by its impulse and partly by its cooling influence, (thus increasing its specific gravity) cause the air at the surface of the earth to move *outwards* in all directions from the centre of the shower, especially in front, while all the time, the air at some distance above is running *inwards* from the circumference of the cloud at its lower borders, and of course upwards in the centre, and outwards in the upper parts. If we suppose a dew point 20° below the temperature of the air, we shall find, by calculating according to the law (article 3,) that the lower borders of the cloud will be a little more than twenty hundred yards high; and when the dew point is nearer the temperature of the air, the cloud will be nearer the earth at the lower extremity. This reasoning applies to clouds of moderate size.

23. But if the cloud is of great size, then the supply of air to keep up the ascending column cannot be afforded without reaching down to the surface of the earth, even when the lower part of the cloud may be at a considerable distance above the surface of the earth. Thus the law will become general, that *in all very great and widely extended rains or snows, the wind will blow towards the centre of the storm.*

24. From this law it will be easy to understand (when a round storm is in our neighborhood) not only the direction in which it is raging, but the course in which it is moving. For let



A E B be the direction in which the centre of a storm is moving, say from west to east, and C an observer to the north of that line, and D one to the south, when the storm comes within disturbing influence, as at A, the observer C will have the wind to begin to blow from a point north of east, and the observer D from a point south of east, and to the observer E, due east. When the storm shall have advanced to E, the wind to observer C will be changed

round to north, and observer D to south, blowing at that time with its greatest violence; whilst to observe E, it will be calm, without having changed its direction, only having gradually increased in violence, as the borders of the storm approached, and gradually diminished in violence as the centre approached. Moreover, if the storm is very violent and not very wide, the barometer at E will be very low when the centre of the storm is there, and there will at that time be no rain; for the upward motion of the air will carry with it the drops of rain, and throw them off at the sides; but, in the mean time, it will continue there very dark and cloudy.

As the storm passes onwards towards B, the wind will suddenly commence blowing from the west at E, increasing in force there for some time after it begins to diminish its violence at C and D, where it is now changing round respectively to west of north, and west of south. In like manner it may be shown, if the storm moves in any other direction, that this direction may be as-

certained by a single observer, provided the storm is round.

25. If the velocity with which storms travel along the surface of the earth shall be ascertained, then not only their direction but their distance from a single observer may be known from the angular velocity with which the wind changes.

Science News Letter, July 25, 1931

Spending a day with a razorback hog may not be an attractive enterprise, but such a procedure recently yielded some valuable information to the State Forest Commission of Mississippi.

Believing that the razorback was a serious destroyer of longleaf pines, and wanting to get irrefutable evidence on the subject, P. N. Howell, one of the commissioners, followed a hog for eight and one-quarter hours, from 8:00 o'clock in the morning to 4:15 that afternoon. In that time Mr. Howell counted 400 trees which the hog rooted out.

GEOLOGY

Studies on Mineral May Yield More Accurate Age of Earth

NEW MEASUREMENTS on a very old mineral have given the possibility of a new accurate determination of the time since the molten earth cooled sufficiently to form a solid crust. This new glimpse into the past of the earth comes as a result of the work of Dr. A. von Grosse and Dr. J. D. Kurbatow working at the Institute of Technology, Berlin.

That the earth is at least 1,800 million years old is one of the conclusions recently reached as a result of studies in physics and geology by the Committee of the National Research Council. A revision of previous calculations may be necessary, however, since the recent work. Physicists have grown accustomed to changing their estimates on this problem from time to time. During the last century, before the discovery of the radioactive atoms like radium, the noted British scientist, Lord Kelvin, was quite sure that the sun even could not be older than 50 million years; and of course the earth had to be younger than the sun.

The new research in Berlin indicates

that the ratio of actinium to radium is four per cent. in the "Wilberforce uranite" examined. This fact gives a new check-up on the reliability of the most accurate clocks used by physicists in solving this problem. Those clocks are provided by the unchanging disintegration of heavy radioactive atoms into lighter atoms.

Uniform Rate of Disintegration

As this process has been going on for millions of years at the same rate as now, it is possible by measuring the amount of lighter atoms formed to know how long the break-up has been going on. These lighter atoms are very similar in nature to lead, and cannot be distinguished from it by ordinary chemical means. Separate clocks are given us by three different chains of elements which start from uranium, thorium and the yet-unknown parent of proto-actinium. The end of the uranium chain is radium "G," of the actinium chain is actinium "D." By measuring the amounts of lead, uranium and thorium and the relative amounts of

radium G and actinium D two independent checks on the age of the earth can be obtained from the radium clock.

The new figure given for the actinium-radium ratio is different from that accepted by the National Research Council Committee: three per cent.

At present the greatest possible age for our planet is believed to be 3,000 million years.

Science News Letter, July 25, 1931

INVENTION

Dripless Pitchers Designed By German Engineers

GERMAN ENGINEERS are developing pitchers that will not drip on the table.

An investigation of household appliances in general is being conducted under the auspices of the German National Engineering Society, Verein Deutscher Ingenieure, a report to the American Standards Association reveals.

The hausfrau's necessity of buying only inexpensive and foolproof articles has prompted engineers to lend a hand. Correct design of home utensils is receiving careful study while engineering is also being applied to such problems as nutrition, food preparation, and heating and lighting.

Science News Letter, July 25, 1931

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PHYSIOLOGY

Automatic Reaction Protected Body Before Mind Developed

BEFORE conscious mind evolved, there was the automatic protective response of the living thing which still operates in the unhappy physiological "kicks" that hay fever-producing pollens give the unfortunate human sufferer.

This new idea of one phase of man's evolution has been advanced in a scientific paper by Dr. Henry Sewall of the University of Colorado, just published in the magazine, *Science*.

His theory concerns the nature of that very perplexing condition called allergy, present in hay fever, for instance.

Some unfortunate people are hypersensitive to the protein material in various plant and tree pollens, so that tiny amounts of these proteins cause the sneezing, sniffling and otherwise distressing condition known as hay fever. Still other people are hypersensitive to the proteins of certain foods, and become startlingly ill after eating such foods. Fish and eggs are often the offenders in these cases.

The protein of disease germs also causes widespread reaction in the bodies of sensitive persons. The germ of tuberculosis is particularly active in this regard. People who are not affected by germ proteins are called immune to that germ or disease. But whether it is hay fever or idiosyncrasy for certain foods or susceptibility to disease, the entire

condition is spoken of by scientists as allergy.

Many theories have been advanced as to the nature and cause of allergy, but none of them has been universally accepted. Dr. Sewall suggests that if allergy is considered as similar to a mental response to danger, research on it may be more fruitful and conclusive.

Allergy, he explains, seems to be the response of the body to an invading enemy. Fear and pain are other responses which we make when danger threatens. These responses, however, are mental.

Response to Enemy

Before men and other animals had progressed to the point of having minds, so that they could feel pain and fear, the organism was merely a community of living cells. Yet this community must have had some way of meeting danger from without, or it would never have survived to develop into the animal and human bodies we know today. Allergy may have been the pre-mental response of these cell-communities to danger, a sort of forerunner, in the evolutionary scale, of fear and pain, Dr. Sewall suggests. It has persisted in the highly developed bodies we now have, so that it forms an auxiliary to fear and pain as a means of protecting us from danger and attacks of invisible enemies.

Science News Letter, July 25, 1931

STANDARDS

"Skin" Test Determines Wear Length of Varnishes

SCIENCE has made it possible to tell which finishes, varnishes, and lacquers will wear longest. Under a unique test recently developed at the Bell Telephone Laboratories, disks of wood or metal are given coatings of different kinds of finish and speedily rotated through sand. The disk that emerges from the treatment with the least "skin" rubbed off is rated to have had the best finish.

Science News Letter, July 25, 1931

Homing pigeons were used by the Greeks to carry the names of Olympic victors to various cities of Greece.

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ORNITHOLOGY
Nature Ramblings
By FRANK THONE



Hell-Diver

THE GREBE gets its infernal nickname not in mockery or derogation, but as a compliment. It is the champion submarine of freshwater birds, the "down-deep-divin'est, long-under-stayin'est" of feathered swimmers. Wary and easily alarmed, it disappears in a split second, leaving scarcely a ripple to show where it has been. And if you can guess where it is coming up, you are better than any hawk or hunter. For it has a habit of staying under until you think it has metamorphosed into a fish, and then popping up for a look-see a hundred yards away. And if it doesn't like the look of things, it is under again before you are sure it is there.

The hell-diver spends its time so little in the air and so much in the water that it has given up almost all of that very important flying organ, its tail. But its twin propellers, its feet, are ideally adapted for work in the water. Instead of being fully webbed, as a duck's are, it has a separate web for each toe. This makes its feet "feathered" more easily than those of a duck, and also permits it to have longer toes with freer movement.

These large feet act more or less like snowshoes when the bird goes ashore on soft mud, which it frequently does. It seems to like this kind of terrain, and builds its semi-floating nest of reeds on the oozy margin of its stream or pond. This habit has earned the grebe its other nickname of mudhen.

The hell-diver is one of the most widely distributed of American birds. It is found all over both North and South America, excepting only the very extremities of the continents.

Science News Letter, July 25, 1931

The United States' forest acreage has shrunk from 800,000,000 acres to 140,000,000.

MEDICINE

Laughing Weakness Treated With Potent Chinese Drug

A SUCCESSFUL method of treating a strange, serio-comic disease has just been reported to the American Medical Association by Dr. John B. Doyle and Dr. Luman E. Daniels of the Mayo Clinic, Rochester, Minn.

Some people who suffer from this disease fall down when they laugh or get excited. This would be funny if the cause were not a serious disease and if this behavior were not a symptom of it. Physicians call this symptom cataplexy. Suddenly, when anything arouses the patient's emotions, his muscles become weak, and he cannot stand.

Another symptom seen in this disease is an irresistible desire to sleep. The afflicted person may be conducting business, he may be driving an automobile, it makes no difference what. He must sleep, and he does, whatever the consequences to himself and others may be. The name for the entire disease, including both the weakness and the sleepiness, is narcolepsy.

Not Sleeping Sickness

This is not to be confused with the disease generally known in this country as sleeping sickness, or lethargic encephalitis, a different thing, in which the brain, to the trained eye of the pathologist, has an abnormal appearance.

In most cases of narcolepsy no cause for the condition has been found. Consequently, in the fifty years since the disease was identified and named, many treatments have been tried, none of which have had very striking success, unless, perhaps, the glandular treatment of Dr. J. Ratner and of Dr. Beyermann, two German physicians.

Recently, however, Drs. Doyle and Daniels have employed ephedrine, a vegetable drug, introduced into this country less than ten years ago by a Chinese physician, Dr. K. K. Chen. Six patients whom Drs. Doyle and Daniels have treated, and two who were treated after their method by Dr. H. A. Collins, have been relieved of symptoms, most of them completely.

The discoverers of this treatment do not claim that they have a cure for this disease, for the patients must continue to take the medicine, and some possibly would have to take more of it than would be good for them, for the drug is powerful.

Science News Letter, July 25, 1931

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• First Glances at New Books

Biography

JOSEPH PRIESTLEY—Anne Holt—*Oxford University Press*, 221 p., \$3.50. By this scholarly and attractive work the author wishes to rescue Priestley's many-sided life from neglect. Because his scientific activities have received most attention at the hands of biographers it is not generally realized that he aspired to be at once, preacher and teacher, linguist and historian, grammarian and flute-player, chemist and theologian.

Science News Letter, July 25, 1931

Aeronautics-Meteorology

THE NAVIGATION OF THE AIR AND METEOROLOGY—Capt. Leslie S. Potter—*Harper*, 233 p., \$4. A simple, yet comprehensive, book of fundamentals that every air pilot must know if he would fly off wing-swept routes.

Science News Letter, July 25, 1931

Physics

PHYSICAL SCIENCE—Herbert Brownell—*McGraw-Hill*, 313 p., \$2.50. A survey of all fields of physical science for college freshmen, extending the idea of "general science" to this level. The author has considered himself free of the restraints necessarily imposed when teaching a specialized science. He is particularly anxious to stimulate a desire to know and to arrive at conclusions independently—especially conclusions based on facts. His book should help the right kind of teacher achieve these ends.

Science News Letter, July 25, 1931

Aeronautics

BIBLIOGRAPHY OF AERONAUTICS, 1929—Paul Brockett—*Government Printing Office*, 242 p., 35c. A comprehensive list of the aeronautical publications for the year 1929, arranged in simple dictionary form with author and subject entry, and one alphabetical arrangement. Published by the National Advisory Committee for Aeronautics, it is the most recent volume of a series covering more than a score of years.

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Malacology

THE TYPES OF LAMARCK'S GENERA OF SHELLS AS SELECTED BY J. G. CHILDREN IN 1823—A. S. Kennard, A. E. Salisbury and B. B. Woodward—*Smithsonian Institution*, 40 p. A re-publication of an almost-lost classic of systematic zoology, making a valuable

basic document more generally available to students interested in its special field.

Science News Letter, July 25, 1931

Aeronautics

SAILING THE SKIES, GLIDING AND SOARING—Malcolm Ross—*Macmillan*, 276 p., \$2.50. This most fascinating sport, new in America, is described in a manner to intrigue the interest of those of us who never expect to soar, as well as to furnish needed preliminary information for the prospective gliding student.

Science News Letter, July 25, 1931

Health Education

OUR JOURNEY OF GROWTH—Francis M. Walters—*Heath*, 251 p., 80c. Book One of the Practical Hygiene Series. This little volume is a primer in health education, better written than most of them. An effort is made to arouse the child's interest and cooperation by relating the material to his growth, in which he takes a pretty keen interest naturally.

Science News Letter, July 25, 1931

Health Education

OUR HEALTH FOUNDATIONS—Francis M. Walters—*Heath*, 276 p., 88c. Book Two of the Practical Hygiene Series. Written for seventh and eighth grades. The old-fashioned, dry as dust physiology text books are being replaced by hygiene books which relate the facts of physiology and anatomy to healthful living. One of the more wide-awake and interesting is this by Dr. Walters. The viewpoint is sufficiently intelligent and adult so that parents, wanting to brush up on the subject, might profitably borrow young son's school book for an evening.

Science News Letter, July 25, 1931

Ornithology

BIRDS OF THE KELLEY-ROOSEVELT EXPEDITION TO FRENCH INDO-CHINA—Outram Bangs and Josselyn Van Tyne—*Field Museum*, 86 p., 75c. An annotated check-list of an important recent collection, with a few excellent colored plates.

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Chemistry

MODERN CHEMISTRY—Chas. E. Dull—*Holt*, 776 p., \$1.80. An excellent high school text humanized by the addition of numerous illustrations.

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Mathematics-Egyptology

THE RHIND MATHEMATICAL PAPYRUS—Translated by Arnold Buffum Chace and Henry Parker Manning—*Mathematical Association of America*, Vol. 1: 210 p., Vol. 2: 109 plates, \$20 per set. This famous papyrus, found in the ruins of Thebes years ago, became broken apart and a number of fragments were lost. In 1922, some of the missing pieces were identified among the collections of the New York Historical Society. The papyrus has been the subject of much study. The Mathematical Association has now rendered the service of publishing not only photographs of the papyrus but also hieroglyphic transcription, transliteration, literal translation, free translation, mathematical commentary, and a bibliography on Egyptian mathematics. The papyrus, which may be divided in three parts, deals with arithmetic, geometry, and miscellaneous arithmetical problems. The problems shed light on Egyptian customs, and the arithmetical processes show the fine reasoning power which the Egyptians possessed. Some of the methods of solution are still in use.

Science News Letter, July 25, 1931

Aviation

THE SKY'S THE LIMIT—Lieut. D. W. Tomlinson—*Macrae Smith*, 289 p., \$3.50. A crack flier's own story; a unique, first-hand record of the airplane's development, a tale of sensational exploits, crashes, of barnstorming days, transcontinental flights and the most startling stunt flying in the annals of naval aviation.

Science News Letter, July 25, 1931

Chemistry

QUALITATIVE CHEMICAL ANALYSIS—Louis J. Kurtman—*Macmillan*, 539 p., \$3.75. A complete college text, giving both theory and thorough laboratory instructions. The author is associate professor of chemistry at the College of the City of New York.

Science News Letter, July 25, 1931

Aeronautics

MODEL AIRPLANES—Compiled with assistance of Elmer L. Allen—*Boy Scouts of America*, 52 p., 40c. Any boy with average skill can learn to build and fly model airplanes, and find it fascinating. The illustrated directions given here are not too complicated to follow.

Science News Letter, July 25, 1931